



Posttraumatic Growth as a Response to Natural Disasters in Children and Adolescents

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Abstract

Purpose of Review This review examines factors thought to be associated with posttraumatic growth (PTG) (demographic variables, exposure, and family and social processes) among youth exposed to natural disasters, describes the relationship between PTG and posttraumatic stress, and discusses psychological processes (rumination and coping) linked to PTG.

Recent Findings Guided by PTG theory and the literature on PTG in adults, research has revealed relationships between PTG and child, environmental, and family and social factors among youth though the results are mixed. Youth's subjective exposure to disasters, their level of posttraumatic stress following the disaster, and the type of psychological processes they employ to cope with the disaster appear to be associated with PTG.

Summary Research has garnered preliminary support for PTG in children exposed to natural disasters but additional research is needed to fully explicate these relationships and to understand how these relationships change over time.

Keywords Posttraumatic growth · Natural disasters · Children · Trauma · Disaster reactions

Introduction

Posttraumatic growth (PTG) is defined as a significant positive change in an individual's life as a consequence of exposure to a traumatic event [1]. PTG is a process that goes beyond the absence of symptoms or a return to baseline functioning following a trauma. The concept of growth from adversity dates back to ancient philosophical and religious thinking. However, the empirical study of PTG is relatively recent, and only within the past decade has PTG been examined in youth. In fact, the first review paper on PTG in children and adolescents was published in 2011 by Meyerson and colleagues [2]. The review—which included studies of youth who experienced illness, accidents, loss, interpersonal abuse and neglect, war, terrorism, and natural disasters—synthesized the literature, revealed correlates and aspects of PTG,

and highlighted areas for future research. Of these areas, type of trauma (e.g., illness, terrorism) and its relationship to PTG was examined in only two studies [3, 4] despite the fact that type of trauma is one of the most significant moderators of posttraumatic stress disorder (PTSD) rates in both adults [5] and children [6] often dichotomized as non-interpersonal versus interpersonal. It is therefore plausible that the pathway to growth will also differ among these types of exposures. The current study focuses on natural disasters, a non-interpersonal trauma, because of the unique impact natural disasters are posited to have on social and cognitive processes—both of which are implicated in the growth process. This review seeks to answer the following questions:

1. What do we know about PTG and children's response to natural disasters?
2. What individual characteristics (e.g., demographics), environmental factors (e.g., trauma exposure), and family and social processes (e.g., social support) are related to the PTG process in youth following a natural disaster?
3. What is the relationship between posttraumatic stress and PTG in youth following a natural disaster?
4. What psychological processes (e.g., rumination, coping) are related to the PTG process in youth following a natural disaster?

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5. What are the next steps for research on PTG in youth following a natural disaster?

Posttraumatic Growth

According to Tedeschi and Calhoun's model of PTG [7], growth is thought to evolve as a result of the struggle and distress one experiences in the aftermath of trauma. This struggle and fear are thought to initiate a process of rumination that, at first, is intrusive, distressing, and automatic. Eventually, with the reduction of emotional distress and other supporting factors, a process of deliberate rumination occurs, whereby individuals attempt to make sense of their post-trauma reality through conscious and deliberate thought, also considered as cognitive engagement [7]. In attempts to reconcile their past and their present, individuals disengage from a previous worldview that no longer fits with their current reality. New goals and schemas are adopted, leading to positive changes in the way individuals view themselves, others, and the world around them [7]. According to Tedeschi and Calhoun, specific characteristics of the person and the challenging circumstances, management of emotional distress, cognitive engagement, and proximal and distal sociocultural influences are believed to directly influence the growth process [7]. The experience of posttraumatic growth is thought to be reflected by a significant change in different domains of functioning, specifically how the individual relates to others; their perception of increased personal strength, spiritual change, and a greater appreciation of life; and the emergence of new possibilities in their life [8].

Posttraumatic Growth in Adults

The majority of studies exploring PTG in adults have based their investigations on Tedeschi and Calhoun's model of PTG, which has served as a road map for research in this area. Numerous meta-analytical studies exploring PTG have been conducted with adults across varying trauma types e.g., [9–11]. Results from adult studies evidence support for the relationship between PTG and various demographic (e.g., gender, age), psychological (e.g., perceived stress, positive affect, coping style) and social variables (e.g., spirituality, religiosity, social support). Findings from the adult literature have served as a foundation for exploring PTG among children. When extrapolating from adult findings, it is important to reflect on the differences between adults and children, and how this might influence the growth process. It is assumed that cognitive and psychological processes (e.g., insight, productive rumination, schema alterations) are a part of the pathway leading to PTG. Children may differ from adults in the

attributions they make, in their coping skills, and in their capacity to attend to and challenge internal experiences [12]. Children also rely on adults and caregivers to manage distress following trauma and to make sense of the world around them. For better, or at times for worse, children are highly susceptible to the influence of caregivers. Parental reactions to distress, the parent-child relationship, and the availability of caregivers, all play a role in children's coping response [13] and influence their coping. In addition to these factors, childhood represents a time of rapid developmental change, and one's management of traumatic stress, and in turn growth, will reflect the developmental period of the child.

Natural Disasters and Children's Reactions

Natural disasters have potentially devastating effects that are unlike those of interpersonal trauma and illness. Most notably, disasters wreak havoc not only on a child's microsystem, defined as the child's interactions with his or her immediate environment (e.g., family, peers), but on their macrosystem (e.g., laws, customs, cultural practices) and exosystems (e.g., institutions, services, policies affecting youth) as well [14]. In the aftermath of disaster, the community that supports a child's development undergoes significant disruption. Children's way of life, including their physical, intellectual, and psychological well-being, may be significantly affected. In addition, disasters commonly generate extensive media coverage and create a host of secondary adversities (e.g., property damage, rescue and recovery efforts, dislocation and relocation, disruption of services, economic loss), which create additional exposures for children [15]. Looking towards the resilience literature, Ungar argues that resilience constitutes a reflection on the quality of one's environment and its ability to enable growth, as opposed to an individual trait or factor [14]. Community factors may be especially important in the growth process for youth exposed to disasters. Because disaster trauma is collective, the child's usual sources of social support, such as parents, family friends, peers, teachers, school, or other community members, may be compromised and negatively influence the child's recovery. Disasters also may prompt compassion and assistance among survivors, community members, professionals, and others, but this tends to be time limited with the need for support often exceeding its availability [16].

A recent line of research has explored the trajectory of children's disaster reactions. While this literature is relatively sparse, long-term follow-up studies and recent empirical research suggest that recovery is the most common outcome for children following a disaster [17]. For example, La Greca and colleagues examined children's posttraumatic stress symptoms after Hurricane Andrew, identifying three distinct trajectories [18]. In their sample of 568 children, the majority had a pattern of response that reflected either resilience (37%), with

low symptom levels and a small significant decrease over time, or recovery (43%), with increased symptoms and a steep decline over time. Chronic distress occurred in only 20% of youth who experienced clinically elevated symptoms which, while declining, remained at or near clinical levels over time. Similarly, Self-Brown and colleagues found these trajectories among a sample of youth exposed to Hurricane Katrina [19]. The majority of children in their sample were classified as resilient (71%). Notably, neither study examined a PTG trajectory. A recent study of children and adolescents after the 2013 Ya'an earthquake in Sichuan China identified three patterns of posttraumatic stress symptoms and posttraumatic growth reflecting resilience (9%), thriving (76%), and stressed and growing (15%) [20]. The resilient group reported mild PTSD symptoms and PTG, the thriving group reported mild PTSD symptoms and moderate PTG, and the stressed and growing group reported clinically significant PTSD symptoms and moderate PTG. Thus, while this literature is relatively sparse, emerging empirical research suggests that resilience and recovery are common in children exposed to disasters. Future studies of the trajectories of child symptoms post event should include measures of PTG.

Factors Associated with Posttraumatic Growth

In their model of PTG, Tedeschi and Calhoun implicate the nature of the event, exposure, type of cognitive processes utilized to cope with distress from the event (e.g., rumination, narrative development), and available resources to help facilitate coping and regulate distress (e.g., social support) [7]. This path to growth is undoubtedly influenced by a number

of factors including characteristics of the child, family, and broader cultural context. While not exhaustive, the following section summarizes the available literature on the factors presumed to influence the growth process in youth exposed to disasters. Information on the studies reviewed can be found in Table 1. The relationship between factors described above and PTG are summarized in Table 2.

Children's Characteristics

Studies of children in the context of natural disasters have been inconclusive with respect to the relationship between PTG and demographic features. In contrast to the adult literature, which has shown a stronger relationship between being female and PTG, most of the child studies that have examined gender have found no gender differences in PTG and no relationship to PTG [21, 25, 27, 32, 33]. Only one study found that girls reported higher levels of PTG than boys [22]. Several studies have found a negative relationship between age and PTG [22, 32, 33] but a number of studies have failed to find a significant relationship [21, 24–28]. In contrast to results from the review conducted by Meyerson and colleagues, which found a positive relationship between age and PTG for children exposed to illness or an interpersonal traumatic event [2], no studies of children exposed to natural disasters have found a positive relationship between age and PTG. Not surprisingly, meta-analytical findings from adult studies also yield different findings with regard to age. Helgeson found greater benefit (i.e., positive effects that result from a traumatic event) among younger adults [9] while Vishnevsky and colleagues found that among females, PTG scores increased with age [11].

Table 1 Study characteristics

Study	Country	Trauma exposure	Methodology	Age
Cryder et al. [21]	USA	Hurricane Floyd	Cross-sectional	6–15 (M = 9.5)
Felix et al. [22••]	USA	Wild fire	Cross-sectional	Adolescence (M = 14)
Guo et al. [23••]	China	Sichuan Earthquake	Cross-sectional	14–19 (M = 16.5)
Hafstad et al. [24]	Thailand	2004 Tsunami-Thailand	Longitudinal	6–17 (M = 13)
Hafstad et al. [25]	Norway	2004 Tsunami-Thailand	Longitudinal	6–17 (M = 13)
Jia et al. [26••]	China	Wenchuan earthquake	Cross-sectional	Adolescence (M = 15)
Kilmer and Gil-Rivas [27]	USA	Hurricane Katrina	Longitudinal	7–10 (M = 8)
Kilmer et al. [28]	USA	Hurricane Katrina	Longitudinal	7–10 (M = 8)
Wu et al. [29•]	China	Wenchuan earthquake	Cross-sectional	13–19 (M = 16)
Ying et al. [30••]	China	Wenchuan earthquake	Longitudinal	8–19 (M = 13)
Ying et al. [31]	China	Wenchuan earthquake	Longitudinal	Adolescence (M = 15)
Yoshida et al. [32]	Japan	Great East Japan earthquake	Cross-sectional	9–15 (M = 11.8)
Yu et al. [33]	China	Sichuan earthquake	Cross-sectional	< 15 & >15; Jr high HS
Zhou et al. [34]	China	Wenchuan earthquake	Longitudinal	12–19 (M = 14)

Table 2 Study variables and their relationship to child PTG

Study	Demographics		Exposure		Psychological processes	
	Age	Gender	Trauma/media exposure		Rumination	Coping
	Cryder et al. [21]	No significant relationship	No significant difference			No significant relationship
Felix et al. [22••]	Negatively related	Females reported more PTG				Positive Reappraisal associated with PTG
Guo et al. [23••]						PTG served as a mediator between meaning-focused coping and well-being, and problem-focused coping and depression
Hafstad et al. [24]	No significant relationship		Subjective exposure more strongly related to PTG than objective exposure			
Hafstad et al. [25]	No significant relationship	No significant difference				
Jia et al. [26••]	No significant relationship	No significant difference				
Kilmer and Gil-Rivas [27]	No significant relationship	No significant difference			Intrusive and deliberate rumination positively related to PTG	No significant relationship
Kilmer et al. [28]	No significant relationship		Subjective exposure more strongly related to PTG than objective exposure			
Wu et al. [29•]					Post-event intrusive rumination predicted PTG, but not PTSD, through recent deliberate rumination	
Ying et al. [30••]			Indirect Exposure related to PTG			Primary control beliefs positively associated with concurrent PTG, and secondary control beliefs positively related to PTG and change in PTG over time.
Ying et al. [31]						
Yoshida et al. [32]	Negatively related	No significant difference	Positively related to PTG			
Yu et al. [33]	Negatively related	No significant difference	Positively related to PTG			
Zhou et al. [34]	Family factors	Parental PTSS	Family Cohesion	Parental Psychological Distress	Social support	Posttraumatic stress Child PTSS/PTSD
Study						
Cryder et al. [21]	No significant relationship	No significant relationship	No significant relationship	No significant relationship	No significant relationship	
Felix et al. [22••]	Positively related	No significant relationship	No significant relationship	No significant relationship	No significant relationship	Positively correlated
Guo et al. [23••]						Positively correlated
Hafstad et al. [24]						Positively correlated
Hafstad et al. [25]						PTSS did not predict PTG
Jia et al. [26••]						No significant relationship
Kilmer and Gil-Rivas [27]	No significant relationship	No significant relationship	No significant relationship	No significant relationship	Positively related to PTG	PTSD predicted PTG for youth with low trait resilience; PTG predicted PTG for youth with moderate trait resilience
Kilmer et al. [28]						Negatively correlated
Wu et al. [29•]						Positively correlated
Ying et al. [30••]						PTSD predicted PTG
Ying et al. [31]						PTSD predicted PTG for youth with low trait resilience; PTG predicted PTG for youth with moderate trait resilience
Yoshida et al. [32]						Negatively correlated
Yu et al. [33]						Positively correlated
Zhou et al. [34]						PTSD predicted PTG

Research implicates other child characteristics in children's disaster reactions including, for example, their pre-event emotional status, exposure to prior trauma, and major life events post incident [17, 35]. The relationship between PTG and these other child characteristics has not been well examined. A study of Chinese adolescents 1 month after the Sichuan earthquake revealed lower levels of PTG in youth who had experienced at least one of the prior adversities measured including death of a relative, school bullying, serious illness in self or a relative, serious accident, severe mental distress, and corporal punishment [33]. Another study that used prior negative life events as a control variable in multivariate analyses found no significant relationship between the variable and PTG in Norwegian youth who were exposed to the 2004 Southeast Asia tsunami while vacationing in the region [25].

Exposure

Research consistently identifies exposure—both objective exposure (e.g., witnessing death, being injured) and subjective exposure (e.g., self-reported emotional reactions such as fear)—as an important influence on youth's response to disaster supporting a dose-response relationship, in which greater exposure is associated with more adverse psychological outcomes (e.g., posttraumatic stress, depression, anxiety, substance use) [35]. For survivors of natural disasters, their subjective experience, as compared to their objective exposure, may be more pertinent to the growth process. Three longitudinal studies found a stronger relationship between subjective exposure and PTG as compared to objective exposure [24, 25, 28]. For example, Hafstad and colleagues found that PTG was positively correlated with children's self-reported subjective exposure (e.g., fear of death) but not with parent-reported objective exposure (e.g., being caught in the water, child separated from caregiver) [24]. In a follow-up study, Hafstad and colleagues found that both objective and subjective exposure were associated with PTG; however, subjective exposure was more strongly associated with growth [25]. Similarly, Kilmer and colleagues found that children's subjective exposure was related to PTG over and above their objective exposure to Hurricane Katrina [28]. This finding is supported within the adult literature, where objective severity and subjective perceptions of stress were related to more benefit following a trauma [9]. In their review of child PTG relative to a variety of traumas, Meyerson and colleagues found some studies showing a positive relationship between exposure severity and growth and others showing no relationship or a curvilinear relationship [2].

Studies have also examined children's direct exposure (e.g., having been at the site, witnessing the event) and indirect exposure (e.g., learning/experiencing the event from others, through residence in the community, contact with media coverage). Ying and colleagues examined various aspects of exposure including direct exposure (e.g., trapped or injured in

the earthquake), indirect exposure (e.g., knew someone trapped, injured, or killed), subjective exposure (e.g., worry about others), and house damage among adolescent survivors of the Wenchuan earthquake [30**]. Indirect exposure was associated with concurrently measured PTG and changes in PTG over time while direct exposure was not related to PTG.

Children may also be affected by contact with disaster-related media coverage which often plays a prevalent role after disasters. Studies have found, for example, a relationship between contact with media coverage in the acute phase after a terrorist incident and posttraumatic stress reactions in children [36, 37]. While most child disaster media studies have examined terrorist incidents, several natural disaster studies have also been conducted [33, 38, 39]. Some children may be at heightened risk for adverse reactions to media coverage [39]. For example, children with pre-existing posttraumatic stress related to Hurricane Katrina were especially sensitive to television coverage of Hurricane Gustav [39]. Reflecting the importance of direct personal exposure and the direct personal exposure of close associates, the Diagnostic and Statistical Manual (DSM-5) specifically excludes contact with media coverage, except work-related contact, as a qualifying exposure for the diagnosis of PTSD [40]. That does not mean that exposure to media coverage does not affect youth disaster outcomes including PTG outcomes. Yoshida and colleagues found that contact with media coverage of the Great East Japan earthquake was associated with greater PTG in children perhaps because it facilitated deliberate rumination [32]. In a study of the 2008 Sichuan earthquake in China, exposure to positive news coverage was protective against depression and suicidal ideation while exposure to scary news reports created risk for PTSD and depression [38]. Another report related to the same sample revealed that exposure to encouraging and touching earthquake-related news reports was associated with PTG and reduced suicidal ideation [33]. Thus, while contact with media coverage does not constitute disaster exposure, it is reasonable to consider and assess media contact in relation to both adverse and adaptive outcomes in children with various forms of disaster exposure.

Family and Social Processes and Culture

Family Factors

Only three studies have examined the role of caregiver variables in relation to PTG among youth following a natural disaster. While the larger literature suggests that parental distress is a robust predictor of children's adjustment [41], parental posttraumatic stress symptoms and psychological distress (e.g., symptoms of depression, anxiety, somatization) have not been found to be predictive of child PTG [22••, 24, 27]. In one study, parental sick leave (i.e., disaster-related health problems influencing work attendance) was associated with lower PTG scores in children [27].

Looking at caregiver protective factors, conclusions are similarly hard to draw. While one study found that caregiver's PTG scores were positively associated with child PTG scores [24], other studies have not supported this finding [22••, 27]. Two studies examined family cohesion/functioning (e.g., the degree of commitment, help, support family members provide for one another); however, no relationship to PTG in children was found [22••, 24]. One study examined children's perception of their caregivers' warmth and acceptance; however, this was not related to PTG scores in children 2 years post disaster. Only caregivers coping advice (e.g., positive reframing) to children was significantly related to PTG in children; however, this relationship was not significant at follow-up 2 years after the disaster [27].

It is unexpected that more support has not been found for the influence of caregiver variables on the PTG process for youth. Kilmer and Gil-Rivas posit that protective factors, such as warmth and family cohesion, may reduce the likelihood of PTG in children, as they serve to reduce the degree of ongoing distress, thereby limiting the potential for growth [27]. These authors also posit that parental PTG may not be clearly communicated to children, and cite the importance of assessing children's perception of parental PTG rather than relying on parent self-report [27].

Social Support

Findings regarding the relationship between social support and PTG among youth have been mixed. Approximately half of the studies in the review by Meyerson and colleagues found a significant relationship between social support and PTG [2]. When looking specifically at exposure to a natural disaster, results are similar. Two out of four studies that have addressed this issue found a significant relationship between social support and PTG [26••, 33], while two studies failed to find such a relationship [21, 22••]. One explanation for the mixed results may be that social support was defined differently among studies, sometimes measuring its function (e.g., fulfillment of needs), and other times measuring its structural components (e.g., quantity and perceived quality of relationships). Interestingly, the two studies that found a relationship to social support were conducted in China, while the two studies failing to find a relationship were conducted in the USA. While limited by the dearth of studies, it is worth noting that PTG and its relationship to social support may differ based on cultural context, particularly collectivist (generally valuing the needs of the community over the individual) versus individualistic cultures.

Culture

Overall, cultural differences and cultural interpretations have received sparse attention in the literature on child PTG [2]. As stated by Vasquez and colleagues, cultural context shapes, in

part, a person's appraisal of stressfulness, coping strategies utilized, and institutional means of coping. In essence, "values underlying the idea of human growth are likely not the same across cultures" [42] (pg 70). Some have suggested that the idea of growth as overcoming adversity is more suitable to individualistic cultures [43]. Additional research including measurement tools that address diverse cultures and culturally-determined concepts of trauma and PTG [2] in children exposed to disasters is needed. Information on PTG in the studies in this review were based on the translation of psychometric scales developed in the USA.

Posttraumatic Growth and Posttraumatic Stress

The theory of PTG proposed by Tedeschi and Calhoun holds that posttraumatic stress and posttraumatic growth are separate dimensions that can co-exist [7]. Results of a recent meta-analysis examining the relationship between posttraumatic growth and distress among adult populations supported a curvilinear relationship between these constructs, that is, as distress increases so does growth, but only up to a certain point, after which, as growth continues to increase, distress decreases [44]. However, the relationship between these constructs is complex, and results of the meta-analysis also suggest that additional factors, such as trauma type, influence this relationship [44]. Many of the studies examining the relationship between PTG and PTSD in children have been correlational, and thus limited in their conclusions [24, 25, 26••, 29, 32, 33]. The progression from developing posttraumatic stress following a trauma to eventual PTG takes time, and longitudinal studies are necessary to test this complex relationship. Research using longitudinal design across diverse time periods has yielded mixed results that are difficult to synthesize. One study found that PTSD reported 3.5 and 4.5 years following the Wenchuan earthquake predicted PTG at 4.5 and 5.5 years [34]. Another study found that PTG 1 year post hurricane Katrina predicted PTG 1 year later, but posttraumatic stress symptoms (PTSS) was not a predictor of later PTG [28]. Ying and colleagues examined cross-lagged pathways (the influence of one variable on the other) between PTG and PTSD 12, 18, and 24 months following the Wenchuan earthquake [31]. The cross-lagged pathway from PTSS to PTG and PTG to PTSS were non-significant. In line with the recommendations of Shakespeare-Finch and Lurie-Beck [44], this study examined trait resilience as a potential moderator influencing the relationship. The authors found that PTSD at 12 months predicted PTG at 18 months for youth with low trait resilience and that growth at 12 months predicted PTSD at 18 months for those with a middle level of resilience. While this study is not conclusive, the results support the examination of potential moderators such as trait resilience. The

research suggests that the complex relationship between post-traumatic growth and distress should be studied longitudinally and employ moderation analyses to account for contributing variables like trauma type, age, and individual characteristics.

Psychological Processes

Two psychological processes associated with PTG—rumination and coping—have been studied in children in the context of natural disasters.

Rumination

The adult literature supports a positive association between rumination and PTG [45]. Meyerson and colleagues reviewed three studies looking at rumination and growth in children, with two out of three studies finding a non-significant relationship between these constructs [2]. Two studies examined the direct effect of rumination on PTG in children exposed to natural disasters. In one study assessing youth exposed to Hurricane Floyd, Cryder and colleagues found no association between rumination and PTG but did not distinguish intrusive and deliberate rumination and used a cross-sectional design [21]. The authors speculated that while the amount of rumination alone was not significant, the content of rumination may facilitate growth. In a longitudinal study of PTG among school-age children exposed to Hurricane Katrina, both intrusive and deliberate rumination were related to higher PTG scores [27]. Specifically, deliberate rumination was related to higher PTG scores 1 year after the hurricane while intrusive rumination, but not deliberate rumination, was associated with higher PTG scores 2 years after the hurricane [27]. This research supports theories of PTG which posit that growth stems from cognitive engagement, or rumination, focused on meaning making. It is through this positive and adaptive rumination (e.g., “I thought about whether I have learned anything as a result of my experience”) that a new internal narrative is created.

Meyerson’s team recommended that research move beyond correlational studies and consider type of rumination as a mediator in the growth process [2]. Wu and colleagues measured both intrusive rumination (e.g., I thought about the event when I did not want to) and deliberate rumination (e.g., I thought about whether I could find meaning from my experience). These investigators also measured post-event (“soon after the earthquake”) and recent rumination [29•]. Post-event intrusive rumination predicted PTG, but not PTSD, through recent deliberate rumination. Thus, recent deliberate rumination partly mediated the relationship between post-event intrusive rumination and PTG. While inherently limited by the retrospective nature of the study, which asked participants to report their post-event rumination 3.5 years later, examining the type and timing of rumination appears to be

an important step in understanding how this cognitive process influences the development of PTG.

The extant research is complicated by differences in age ranges in the samples studied. The sample assessed by Wu and colleagues averaged 16 years of age [29•] while participants in the studies by Cryder and colleagues and by Kilmer and Gil-Rivas had a mean age between 8 and 9 years [21, 27]. The child’s developmental level is likely to influence the rumination process leading to growth though the specific nature of this influence remains unexamined. Despite limitations, the literature suggests that rumination plays a part in the growth process for children. Tedeschi and Calhoun note that an important part of productive rumination includes disclosing ruminations to adults. It will be important for future studies to examine the relationship between rumination and factors like parent availability and warmth.

Coping

Coping strategies among children have been widely examined [46]. While no unifying theory of child coping exists, three dimensions of coping are commonly discussed within the literature. These include problem- and emotion-focused coping, primary and secondary control coping, and approach and avoidance coping [46]. These typologies recognize differences based on the intent of coping activities. Problem-focused, primary control, and approach coping represent efforts to modify or manage some feature of the individual, the environment, or the relationship between the individual and environment that are seen as stressful; emotion-focused, secondary control, and avoidance coping represent efforts to constrain or control negative emotions associated with the stress [46]. The relationship between coping and distress is thought to be transactional, with distress leading to the use of coping strategies, and coping reciprocally affecting distress [46]. Currently, there is no solid conceptualization of how children’s coping style following a disaster affects the PTG process. The larger coping literature as well as the literature on PTG among adults suggest the positive role of active coping and acceptance coping [47–49].

Ying and colleagues examined the relationship between primary control beliefs (perceived control over a situation), secondary control beliefs (ability to change one’s affect or cognition to cope with stress; e.g., “I accept that this has happened”) and PTG in adolescents after the Wenchuan earthquake [30••]. Primary control beliefs were positively associated with concurrent PTG, and secondary control beliefs were positively related to PTG and change in PTG over time. Two studies have looked at competency beliefs—a child’s perception of his or her ability to handle problems that may arise—and PTG among youth exposed to natural disasters. Cryder and colleagues found that PTG scores correlated significantly with competency beliefs [21], while Kilmer and Gil-Rivas

found no significant correlation between these constructs [27]. Guo and colleagues, who examined PTG as a mediator, found that meaning-focused coping served as a unique resource for adolescents after a disaster [23••]. Interestingly, emotion-focused coping and problem-focused coping did not improve adolescents' well-being, although problem-focused coping did serve to reduce depressive symptoms. In a study by Felix and colleagues, only positive reappraisal (not acceptance or catastrophizing) was associated with PTG in children who experienced a wild fire [22••]. It appears that while cognitive coping serves a key role in the growth process, not all coping skills are equally effective, and future studies will need to explore different types of coping styles on the growth process.

Conclusions

When examining the growth process among children following natural disasters, we were interested to see if previously found associations between hypothesized PTG process variables were different for this population. We were also interested to further explore the PTG process among children and adolescence, since this is a relatively new area of research. When looking at demographic variables, results of this review did not support gender or age differences in rates of PTG. Only four studies examined the role of gender and all included school-age children and younger adolescents. It may be that gender differences emerge later in life, as true with adult findings [9]. No outcome variables (e.g., social support) were found to differ by age, and it is unclear if the growth process is fundamentally different among different age groups. Given the rapid developmental change that occurs in youth, and the importance placed on cognitive functioning and PTG, studies may want to focus attention on developmentally appropriate age cutoffs, creating more heterogeneous groups (e.g., 7 and 8-year-olds versus 14 and 15-year-olds) for comparison.

While we were interested to explore the relationship between media coverage and PTG among children, only two studies explored this relationship, both finding a positive relationship among these variables. Future studies exploring timing and type of media coverage will be important to assess the impact of children's post-disaster environments on the growth process. We were most surprised to find a dearth of literature assessing parent and family variables and PTG among children. Parents play an important role in children's healing process following a trauma. Parental posttraumatic stress, psychological distress, and family cohesion were all found to be unrelated to PTG in children; however, only three studies examined these constructs. When examining parent factors, it will be important to measure children's perception of their parent's functioning rather than relying solely on parent self-report. Results were inconclusive with regard to the relationship between social support and PTG, and future

research will need to include several measures to address both the structure and function of support.

Perhaps most extensively studied, the relationship between growth and distress in children following natural disasters has evolved to include more longitudinal studies. This type of analysis is needed to begin to understand this complex relationship. As posited by Tedeschi and Calhoun, distress and growth appear to be related constructs [1]. How and when they differ in their pathways and influence will be best understood through moderation analyses. Lastly, results of this review generally support a relationship between coping, rumination, and one's subjective exposure as related to PTG in children following a natural disaster.

The study of PTG in disaster mental health is an encouraging trend away from the historical focus on psychopathology. Not only can children survive, but they can thrive and grow in the face of disaster. Many questions around PTG in children remain, and future studies are needed to understand the potential unique process of PTG based on trauma type. However, results of this review point out potential directions for studies to explore causal risks and facilitating factors in the growth process through moderation and mediation analyses. This will be especially helpful to clinicians who can intervene at the level of critical mediators.

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Compliance with Ethical Standards

Conflict of Interest Melissa Bernstein and Betty Pfefferbaum declare no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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Papers of particular interest, published recently, have been highlighted as:

- Of importance
- Of major importance

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